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Wake Turbulence

By LCdr. Gray D. Morrison and Mr. James J. McCue

- A T-2 is maneuvering behind a TA-4 at 4 G's, and an overshoot develops. The T-2 pilot maneuvers across the TA-4's tail at 700 feet and remains in the wake turbulence. The wing fails. One pilot is killed; the other badly burned.
- Two AT-38s are maneuvering. One flies through the other's wake turbulence at 5 G's, loses the left horizontal stabilizer and departs controlled flight. The aircraft is lost.
- During an engagement with an F-4, an F-16 flies through the vortex field in a low-G turn; the AIM-9 launcher and missile depart the outboard wing station. In a separate engagement, an F-5E is maneuvering behind a bogey and loses an AIM-9 launcher and missile.
- An F-4, in a hard-port turn at 500 feet AGL, is leading an A-4, positioning for a simulated attack on an airfield. The A-4 is in trail, in a hard-port 4-G turn, attempting to fly beneath the lead's "jet wash" while crossing 4,000 feet behind at 400 feet AGL. The A-4 immediately rolls inverted and 10-15 degrees nose down. The pilot recovers the A-4 using a 6-G rolling-pullout maneuver but flies through the trees during recovery.

WAKE turbulence is a well-known, well-documented phenomenon and is not exclusively an aspect of taking off or landing behind heavy aircraft. This article reviews the classic characteristics of wake turbulence and shows how it applies to tactical fixed-wing aircraft.

Wake turbulence, more properly called trailing vorticity, is associated with the way a wing produces lift. As the wing moves through the air, it leaves behind a sheet of swirling motion called trailing vorticity. Although a wing can produce the same amount of lift at high airspeed/low angle of attack (AOA) as at low airspeed/high angle of attack, the latter situation produces the strongest trailing vorticity. Its intensity behind a wing increases with load factor and gross weight at the lower airspeeds. Atmospheric conditions such as winds, turbulence and precipitation also influence the severity of the trailing vorticity, as well as its rate of dissipation.

In the fixed-wing tactical environment, wake turbulence is commonly encountered in air-to-air maneuvering, formation flight and "gaggles" overhead in the delta pattern. They are normally felt as mild thumps, buffets or roll-offs, depending upon the effects of dissipation.

Recently, wake turbulence has been recognized as a hazard by the helo community in evasive maneuvering (EVM) tactics where helos are trailing one another at close range. In the fixed-wing community, it was generally only considered serious during takeoffs and landings, and then only when the lead aircraft was a fixed-wing heavy (150,000 pounds or heavier).

The Horizontal "Twister" — Some distance behind the wing, the sheet of vorticity rolls up to form one vortex behind each wingtip. This rolling up of the trailing vorticity occurs several wingspans behind the aircraft. Each trailing vortex is best visualized as a horizontal tornado. The left vortex (as viewed looking in the direction of flight) rotates clockwise; the right

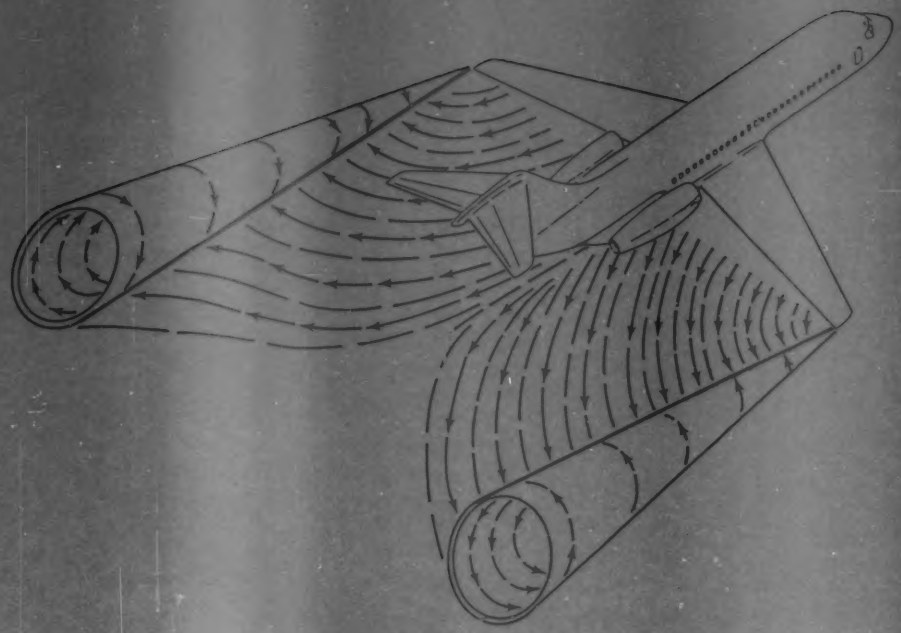


Figure 1

vortex rotates counterclockwise. Each is characterized by the presence of a well-defined core of swirling air as shown in figure 1.

The center of each trailing vortex core is located inboard from the wingtip, at a distance equal to about 10 percent of the aircraft wingspan. The diameter of each vortex core is about 5 percent of the wingspan. Initially these cores descend beneath the wing at a rate of about 500 feet per minute. The maximum swirling velocities in the developed vortex can reach up to 180-200 feet-per-second. Flight tests results have shown that the vortex-induced velocities are essentially constant up to 40 wingspans behind the aircraft. Beyond this distance the vortex-induced velocities decrease, the vortex core diameters increase and the cores begin to move in a oscillatory motion as shown in figure 2.

As distance increases from the generating aircraft, the distance between the left and right vortex cores decreases, the two vortex cores interact with one another and ultimately combine to form vortex rings.

Let's look at the effect this trailing vortex system has on another aircraft that flies into the wake turbulence. There are many approach geometries in which an aircraft can encounter the trailing vortices from a generating aircraft. The most hazardous are the **descent, gust and rolling encounters.**

Descent Encounter — A loss of lift and resultant descent can occur when the encountering aircraft flies into the trailing vortex field. Since the vortex system is descending at about 500 feet-per-minute, an encounter of this type can cause the encountering aircraft to descend due to a loss of lift resulting from a decreased angle of attack. This type of encounter is probably the least severe for tactical aircraft at altitude, but at low altitude the consequences are obviously hazardous.

Gust Encounter — This occurs when the encountering aircraft is flying perpendicular to the axis of the vortex; it appears as rapid, cyclic loading similar to flight through severe turbulence. As the encountering aircraft crosses the wake, it will be subjected to an increase in G forces, followed by a decrease, then another increase. FAA studies have shown that there is a possibility that pilot inputs intended to control the G forces during a vortex encounter can actually be in phase with the vortex induced forces, making the resulting G excursions more severe.

Rolling Encounter — An aircraft that encounters a vortex such that the field of influence has widened to approximately one-half its wingspan, experiences a rolling moment caused from an increase of lift on one portion of the wing and a decrease on the other. During aerial refueling tests of the KC-10 (600,000 pounds gross weight), the near-field region (less than one wingtip distance) caused moderate turbulence to the receiver. However, from one to three miles aft, the influence of the vortex expands to anywhere from one-half to twice the receiver aircraft wingtip distance, causing pronounced rolling and sideslip.

Flight tests have shown that transport-type aircraft can cause light civil aircraft to roll at rates of up to 200 degrees per second. Roll rates of this magnitude are greater than the ailerons can control, and a light civil aircraft encountering the wake turbulence of a heavy transport could be expected to

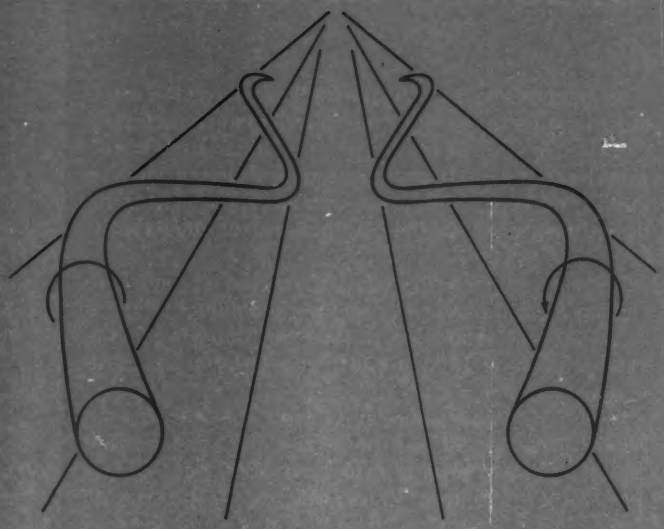


Figure 2 The geometry of sinusoidal instability

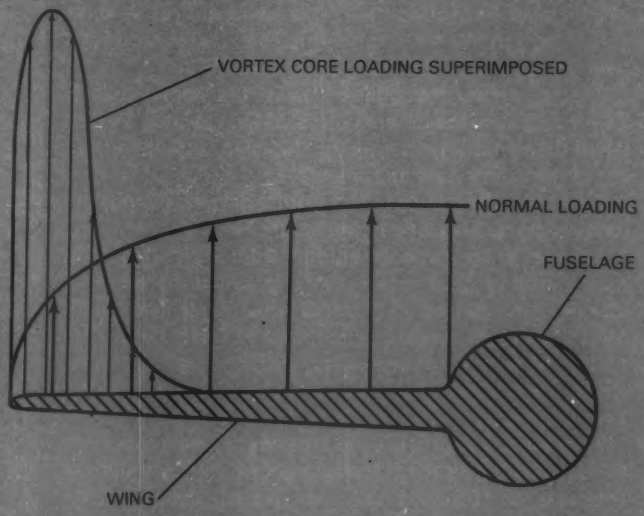


Figure 3

Graphics by Frank L. Smith

roll uncontrollably.

But what about a tactical aircraft encountering the wake turbulence of another tactical aircraft, for example, during air combat maneuvering (ACM)? **The key here is to note that a 30,000-pound aircraft maneuvering at 5 G's produces roughly the same trailing vorticity as a 150,000-pound transport flying at 1 G.** That is, normal acceleration has the same influence on the vortex strength as does increasing gross weight.

The Air Force has conducted studies to determine the roll control of a T-38 flying in 1 G level flight conditions upon encountering the wake of a maneuvering T-38. With both aircraft at 300 knots and the lead pulling 3.5 G's the encountering T-38 required about 85 percent of full aileron control to counter the vortex-induced rolling moments. Given a typical pilot reaction time after encountering a vortex, a T-38 aircraft can be rolled to the inverted position by the trailing vortex before the pilot can regain control. Aircraft with lower roll performance may not be able to counter this vortex-induced rolling moment.

The Unknown Hazard of Asymmetric Lift — An aircraft encountering a vortex parallel to the core axis receives an effect similar to the rolling encounter. The local angle of attack as well as the dynamic pressure from the local increased velocities (200 ft/sec) are altered significantly. A vortex superimposed upon the normal lift distribution directly at the wingtip will cause the highest loading, as shown in figure 3.

This superimposed loading results in a severe increase in the wing-root bending moment, without a significant increase in the load factor at the center of gravity. What this means to a pilot encountering wake turbulence at 4-5 G's is that it does not feel very uncomfortable. The increase in G can be small, and the loading is often cyclic (+/- 2 G's); but the wing is "feeling" a drastic increase of wing-root bending moment, which can fail it at less than ultimate load factor. A recent mishap demonstrated this hazard. As the encountering aircraft was crossing the wake from left-to-right, the right wing failed in the region of the wing root. The wing separation ripped open the fuselage fuel cell, and the aircraft exploded. The counting accelerometer package found in the wreckage indicated that peak normal acceleration on the aircraft was about 7 G's. This is well below the ultimate G load of the wing.

What caused the wing to fail? Wing structures can fail due to excessive wing-root bending moment. Under symmetric flight conditions, the ultimate wing-root bending moment might be that associated with 10 G's. However, under asymmetric flight conditions, such as a rolling pull-out, the same ultimate wing-root bending moment might correspond to only 6 G's. The vortex encounter depicted in figure 3 can be thought of as a severe asymmetric maneuver; therefore, the wing could fail at G loads well below the symmetric ultimate load factor.

The Avoidance — An obvious question is **"Why haven't I encountered this trailing vortex phenomenon during airborne tanking operations, formation flight or ACM?"** Recall that the vortex sheet behind an aircraft does not "roll up" into the

two well-defined trailing vortex cores (wake turbulence) until several wingspans behind the aircraft. For a large tanker, this distance may be several hundred feet. Tanking operations are conducted behind the aircraft but ahead of the "rolled up" vortex. The same is true for formation flying; wingmen generally maintain a position ahead of the wake turbulence hazard.

Consider the trailing vortex hazard during ACM. All ACM flight briefs include a discussion of the rules of engagement (ROE). Fixed-wing ROE clearly state that all aircraft should maintain a 500-foot safety bubble, and the latest change to OPNAVINST 3710.1L refers to the "40 Wingspan Warning Area." The Navy's Fighter Weapons School and the Marine Corps' Aviation Weapons Tactics Squadron (MAWTS-1) have taken another step in implementing a policy of a minimum 1,000-foot trail position. During ACM, the astern position is used for both missile and gun engagements. Missile shots will most likely occur several thousand feet behind the lead aircraft and probably not right on axis. At these distances, the trailing vortex system should be dissipated, and the hazard should be miminal.

Gun engagements, however, occur at much closer ranges. An accurate gun solution might require the attacking aircraft to close to a 1,000-foot separation. However, for gun tracking solutions, the attacking aircraft must pull lead on the bogey. This means he must be maneuvering inside the bogey's flight path. Recall that the trailing vortex system generally settles below the path of the generating aircraft. Hence, during gun tracking maneuvers, a 1,000-foot separation should keep the attacking aircraft out of trailing vortex system of the bogey aircraft. However, the "guns" pilot should realize that if he cannot lead the bogey and inadvertently overshoots, he is increasing his chances of a vortex encounter.

We have presented the hazards of wake turbulence and its ability to cause structural damage. The good news is that a vortex core is relatively small, as are your chances of encountering it. The bad news is that if you do encounter the vortex core, the results can be catastrophic. If you encounter wake turbulence or see the possibility coming, reducing the G loading must be automatic.

No additional restrictions should be placed on tactical training. Tactical training, including ACM, should be expanded, not reduced. The only way this will happen is to show that tactical training and aviation safety are compatible. We have tried to show that tactical training, with strict adherence to ROE, is consistent with the requirement to minimize the chances for a trailing vortex encounter. ◄

LCdr. Morrison is the Head of Safety and Standardization at the U.S. Navy Test Pilot School, Patuxent River, Md. He is on his second tour at the Naval Air Test Center and has a master's degree in aerospace engineering from Georgia Tech.

Mr. McCue is an aerodynamics and helicopter performance instructor at USNTPS, having joined the staff in 1970 after completing graduate studies at Virginia Polytechnic Institute.

Slide Into Homeplate

By Bud Baer

HE climbed into his T-2C at NAS Southwest to fly some touch-and-gos in the FCLP (field carrier landing practice) pattern. He wanted to sharpen his landing technique since he soon would transition to tactical aircraft. Once in the air, he kept the Buckeye configuration dirty as he turned downwind into the FCLP pattern. His initial touchdown was smooth.

Suddenly he felt that something wasn't right. He noticed the right wing drop slightly and thought the tire had blown. He instinctively pushed the throttle to gain the safety of altitude. Then he had to trim the aircraft to make it fly wings level.

As the T-2 climbed back into the air, the LSO saw the right mainmount fall from the aircraft, and he notified the pilot. He directed the aircraft to climb to 600 feet MSL and other FCLP traffic to 1,200 feet MSL. While the crippled plane circled to burn fuel, the arresting gear on the duty runway was de-rigged.

The pilot raised the remaining two landing gear, the left mainmount and the nose wheel, to prepare for a gear up, belly landing in accordance with NATOPS. With his fuel almost exhausted, he circled the field one more time before proceeding to final approach. Approaching the runway, he prepared his aircraft for a full-flap, flared landing. As the T-2 neared the concrete, he noticed how much closer he was to the runway without his landing gear. It gave him a sinking feeling. Then he secured both engines, also in accordance with NATOPS.

The jet trainer tobogganed down the runway for a 2,000-foot slide to homeplate. It skidded to a stop 12 feet left of the centerline. Before the dust had settled, he was out of the plane, safe at homeplate.

Here was a mishap where the pilot did everything correctly to bring his plane home safely.

Subsequent tests on the aging T-2 determined that the main landing gear outer cylinder failed because of fatigue. It happened on the 3,894th landing. The gear's MOT (maximum operating time) was 3,000 landings. The MOT had been extended twice, 500 landings at a time, using a dye penetration inspection technique to test the gear's integrity.

To prevent T-2 strut fatigue, an eddy current inspection is required for all main landing gear outer cylinders at intervals of 100 landings. The mishap board recommended that T-2 struts that exceed their MOT should be replaced.

Bud Baer is a staff writer for Approach.

. . . Our wingman asked if we had seen the light civilian aircraft pass within 500 feet of our left side . . .

Lookout Doctrine and Everyday Flying

By Ltjg. James W. Old

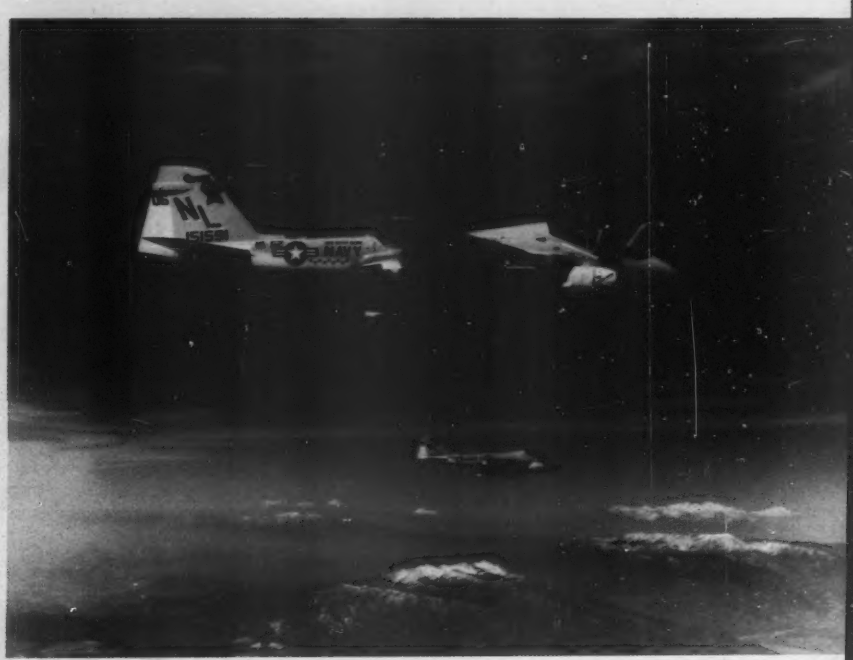
When we hear the words "lost sight of," most naval aviators think of losing sight of their wingman or bogey. In the fighter community, we use the phrase when we talk about air combat maneuvering (ACM), particularly crew coordination, lookout doctrine and keeping track of other aircraft.

Losing sight of an adversary in an ACM engagement is serious and will increase your chances of being shot down. But how often do we discuss lookout doctrine as it applies to routine flying (other than in VT squadrons)?

Recently, we were returning from an overland ACM/strike escort training mission. Everything seemed to be great. The strikers went in untapped, putting bombs on target because the fighters kept the bogies off their backs. Skies were clear with 30 miles visibility. The fighters were returning VFR to NAS Southwest as briefed. Halfway home, I told the pilot that I had a low fuel light. Yet, the fuel totalizer was indicating more than enough fuel.

The pilot looked inside the cockpit to investigate; I broke out the pocket checklist. After checking the fuel tapes, switches and total fuel quantity, we determined that it was a faulty light. This process took less than 20 seconds.

Later, during the debrief, our wingman asked if we had seen the light civilian aircraft pass within 500 feet of our left side. As our attention was inside, I had not seen the aircraft, and my pilot only saw it at the closest point of approach (CPA). The incident points out how important it is to maintain a heads-up attitude, even during routine flying. Just because the ACM portion of the flight is over, doesn't mean it's time to relax your vigilance. The mission isn't over until you're filling out your IFARS sheet.



The lessons learned that day:

- Even when solving problems that require attention to be drawn inside, crew members must remember that they are still in a dynamic environment. At least one person must be looking outside at all times.
- When the lead has a problem requiring action that diverts his attention inside the cockpit, the wingman should be immediately notified so adequate aircraft separation can be maintained. The wingman can also alter his visual scan to cover more of the lead aircraft's flight path.

How good is your lookout doctrine? Do you have a "contract" for responsibilities within your aircraft and defined visual search patterns within your section? Remember, it only takes a few seconds for things to go wrong. You don't want to start discussing visual responsibilities while airborne. You should do it before the flight, during every brief. Your TAC manual delineates lookout responsibilities. Don't get caught thinking everyone is scanning their assigned area 100 percent of the time. If you are forced to go eyes in the cockpit, why not let someone know. If not, you may be in for an unpleasant surprise.

Ltjg. Old is a first-tour RIO with VF-194, NAS Miramar, Calif. He is aviation life support officer.

Hawkeye

SITTING around the ready room or the O-club trading stories about fellow aviators and their exploits is one of our most cherished pastimes. One of the most educational forms of this pastime is the retelling of those unlucky or foolish flights that ended in mishaps. These accounts provide the audience a chance to evaluate some of the reasoning behind all those cautions and procedures in their NATOPS manuals.

Over the years some of these stories have evolved into inaccurate legends. Others have even been forgotten. This is the case in the Hawkeye community, which is characterized by a small number of total aircraft and an even smaller number of mishaps. (From 1980 through 1984, for example, there were no Class A mishaps in the E-2C.)

As a squadron safety officer, I decided to match the facts against the legends and requested Naval Safety Center data on E-2 mishaps. The Safety Center provided data on E-2 mishaps for the period 1964 — 1985. Included in this data were specifics such as model (E-2A, B, C, TE-2A, and TE-2C), year and severity. Especially useful was a narrative that included a brief summary of each mishap's pertinent events and causes.

The Center's data included a total of 53 Class A and B mishaps ("major" and "minor" mishaps under the pre-1977 system), along with dozens of non-damage or limited damage incidents. To the 53 mishaps I added three additional ones that occurred in 1986: An E-2B lost in a midair, an E-2C destroyed on a maintenance turn (engine fire, no flight intended), and an E-2C that suffered Class B damage during an in-flight fire.

These 56 Class A and B mishaps are divided according

E-2 Mishap Data (1964-1986)

Mishap Severity

Flight Phase	Alfa	Bravo
Start/Taxi	8	1
Takeoff	3	2
In-flight	6	7
CV Landing	10	7
Shore Landing	4	8
Totals	31	25

Table 1

E-2 Egress Survival Summary*

Mishap Severity

	Number of Mishaps	Number Survived	Number Fatal	Survival Rate
Water Impact	8	11	21	34%
Ground Impact	4	7	7	50%
Totals	12	18**	28	39%

* Aircraft that could not be successfully landed at an airfield or CV.
** Includes 3 bailouts.

Table 2

Mishaps: Facts and Fallacies

By LCdr. Mark D. Sullivan

to when the incident occurred: start/taxi, takeoff, in-flight, CV landing and shore landing. (See table 1) Several significant trends are evident.

E-2 props present a formidable on-deck hazard. Eight out of 31 (26 percent) Class A mishaps occurred during on-deck start and taxi operations. Damage was primarily caused by impact of E-2 props with external objects, including other aircraft (3), JBDs (2), fire bottles (1) and personnel (1). Aircrew or ground personnel could have minimized or prevented aircraft damage in the majority of on-deck mishaps.

Takeoff emergencies require accurate and coordinated action. Four out of five takeoff mishaps were caused by incorrect takeoff procedures or a lack of crew coordination, or both. Takeoff emergencies and aircrew duties must be prebriefed and practiced. This critical evolution provides little time for consultation and analysis.

E-2 lineup is extremely critical on CV landings. Nine out of 17 carrier landing mishaps involved lineup errors during touchdown, rollout or bolter. Only one ramp strike was recorded, with minor damage to the tail skid and rudder fin. While T-56 engine performance provides excellent response to a below glide slope situation, the E-2 wingspan provides little room for error in lineup. Precision lineup must be exercised during approach, touchdown, rollout or bolter. LSOs and copilots can provide timely assistance with this crucial factor.

E-2 emergency egress is difficult. Table 2 focuses on 12 mishap aircraft that were not successfully landed either on the flight deck or on a runway. If the air crew had an ejection seat capability, they probably would have elected to use it. These 12 mishaps reflect the results of E-2 air crew decisions in critical situations and their ability to egress under those conditions. Only 39 percent survived egress and a number of those were injured. There have been no preplanned E-2 ditchings. Only three bailouts have been successfully attempted. Analysis of these mishap narratives suggests that bailout attempts were done incorrectly or too late, and ditching can be survivable if done under controlled conditions.

Some of these trends reflect well-worn axioms, but the mishap data suggest that they deserve repeating:

- E-2 prop tips travel at 533 mph and must be given proper respect and judicious clearance during on-deck procedures.
- Lineup must remain a priority scan item because carrier landing areas will continue to provide minimal E-2 wing tip clearance.
- Catastrophic in-flight or landing emergencies that cannot be immediately rectified provide E-2 aircrew with two options: bail out or ditch. Regular squadron discussion and practice in a variety of emergency scenarios can provide correct, expedient procedures that will improve survival rates in either case.

This Safety Center mishap data provides a wealth of information for discussion on normal and emergency procedures. Historical mishap data can provide a starting point for good sea stories based on fact rather than myth.

LCdr. Sullivan is the safety officer for VAW-126. He has over 3,000 hours in the E-2C and C-2A accumulated during tours with VRC-50, VAW-125, VAW-120 and his present squadron.

It Won't Happen to Me

By LCdr. Edward A. Lenio

IN my 11 years of naval aviation, I had never had an emergency I couldn't handle. I had my share of potential engine failures, chip lights and hydraulic failures; each time I brought my aircraft back and walked away with a grin and a sigh of relief. Then, one night, there was no walking away.

The flight was routine in every aspect — heard that before? — an ASW flight under the control of an FFG, hot seat at 0130, recover 0530.

Despite heavy flying for several days, I felt ready, well-rested and well-fed, the best I'd been in three days. The brief was normal, and a review of the ADB revealed no startling information. During the hot seat we were informed the dome control was down, implying no dipping for our flight. A change of tactics occurred but nothing out of the ordinary.

Takeoff was EMCON. The flight to our assigned sector allowed us to discuss tactics and update our tactical display. We checked in with the FFG and were permitted to proceed single-ship, giving periodic position reports. For the next three hours, we stayed at 500 feet and searched for the exercise submarine with sonobuoys and MAD. Then it was time to return for recovery and subsequent shutdown. During the entire evolution, there was not one indication that anything was wrong. To the contrary, everything was perfect, a smooth flyer, a pitch black night without dipping, and so on.

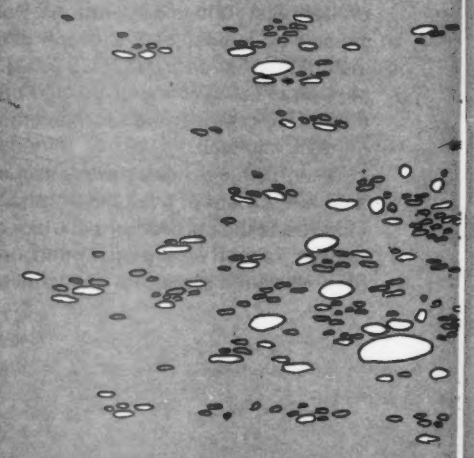
Recovery was also under EMCON. Check-in with Approach Control was normal, and I was cleared for a visual approach. I then discovered that my copilot, in the right seat, had never performed a visual landing at night. We took a few minutes to brief the maneuver, and I decided to talk him through the evolution. Landing checks were completed and we commenced the approach. Knowing the angle would be clobbered, we would fly a glide slope approach and, when on short final, slide left and fly up the port side of the ship to the landing spot. As we performed our approach, we didn't receive a green light on final clearance to land, so we executed a wave-off immediately entering port delta. Several orbits later Tower cleared us for landing on Spot 4.

We started another approach, this one a little different from the first. Since we had good visual contact with the CV, we decided to shoot an angled approach (45 to 60 degrees), turn to parallel ship's course, and when in position, slide right and land. The copilot began the approach; altitude and airspeed were normal. As a matter of fact, everything was 4.0 throughout the initial stages of the approach. As we continued to an in-close position, the bearing shifted forward. No major problems. As we proceeded closer, I waited for my copilot to begin a port turn to parallel the ship's course. The aircraft continued to descend to 65 feet. I called for power. At 60 feet I called again for power. As the copilot responded, I picked up a right yaw (instead of the expected left yaw to complete the turn). I responded by calling "left rudder" to which he replied, "I have left rudder in." The yaw rate was increasing rapidly, and I could see several aircraft on the deck confirming our close proximity to the CV.

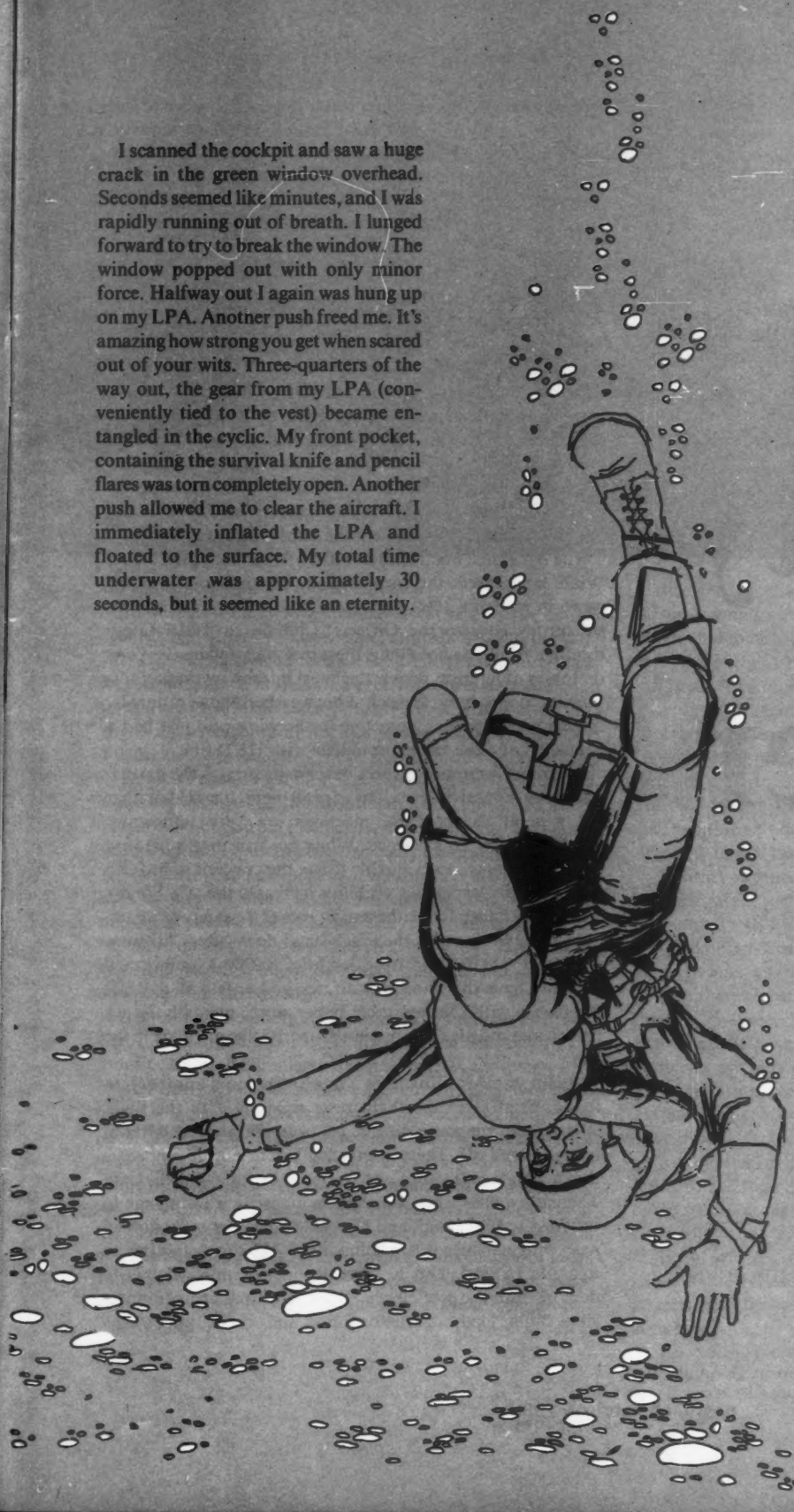
I immediately took control of the aircraft and added full left rudder. No response. The thoughts raced through my mind. "Tail rotor failure, autorotate. Can't, too close to the ship. Add opposite cyclic to help control aircraft, reduce collective to begin descent."

The ship's deck caught my eye as we completed our first revolution. The aircraft was out of control. "I wondered if it was a dream. The copilot called out "Ten feet!" and I pulled collective to cushion the impact. At this point the helo was approximately 30 degrees left wing down, 20 degrees nose down.

The helo immediately rolled inverted and filled with water. I never felt so glad to feel water on my face as I did then; it meant I survived the crash. For the first time, I felt confident I could handle the situation I was in. As a part of our squadron SOP, all air crew completed 9D5 helo dunker refresher every six months. I waited for all motion to cease, disconnected my harness and ICS cord, and searched for an exit. My hand went right out the window giving me the impression it popped out from the violent impact. I was half-way out when my LPA got stuck on the still intact window. Several attempts to free myself failed and I crawled back inside where I frantically searched for the release handle. Disoriented and in total darkness, I began to panic. My training helped me calm down.



I scanned the cockpit and saw a huge crack in the green window overhead. Seconds seemed like minutes, and I was rapidly running out of breath. I lunged forward to try to break the window. The window popped out with only minor force. Halfway out I again was hung up on my LPA. Another push freed me. It's amazing how strong you get when scared out of your wits. Three-quarters of the way out, the gear from my LPA (conveniently tied to the vest) became entangled in the cyclic. My front pocket, containing the survival knife and pencil flares was torn completely open. Another push allowed me to clear the aircraft. I immediately inflated the LPA and floated to the surface. My total time underwater was approximately 30 seconds, but it seemed like an eternity.



On top, the air reeked of JP-5 from torn fuel cells. Two or three flares from the sponson had ignited, floating close to the aircraft. My ordeal was far from over. Through 8- to 10-foot swells, I saw the reflection of two of my crew member's helmets and began swimming toward them while calling their names. Within a few minutes I joined up with the copilot and the wet-swimmer. When I asked where the other crewman was, the wet-swimmer responded, "He didn't make it out."

Survival was foremost on my mind. We latched the LPA leg straps to each other to ensure no one drifted off. For signaling, my copilot used his strobe light, the wet-swimmer used his PRC-90, and I would use dye marker. I decided not to use smokes due to the strong odor of JP-5 despite the fact that aircraft flares had not ignited any fuel.

We were settled and only had to wait. We could see our squadron mates turning on board the CV and knew it would be only minutes, enough time to dwell on our lost companion. The helo sank in five minutes.

Less than 20 minutes after we'd hit the water, we were safe on board the rescue helo. Once on board the CV, we got some great news — the other crewman had also escaped but had been floating 50 yards on the opposite side of the helo! The sea state had prevented us from finding him. During the hours of debriefing, one factor was clear: The extra 9D5 egress training we received was directly responsible for our successful escapes. Everyone moans and groans when we do those pain-in-the-rear egress drills, but the fact is that they teach you to think under extreme pressure, to remain calm and avoid panic. Most importantly, they build your confidence. When you're placed in the worst of predicaments (total darkness and underwater), you need that feeling that "I've been here before, and I can handle this."

Since this accident occurred, the HSWING ONE community has increased the use of 9D5 helo egress training for all air crew. Believe me, it's well worth *your* time and money. It may be worth your life. ◄

LCdr. Lenio is the safety officer for HS-17.

The Navy keeps a record of the last 10 flights' write-ups. Once a gripe is signed off in the Air Force, it is no longer carried. A good memory is essential in tracking repeat problems.

Safety On the Other Side

By LCdr. John T. DuGene

WHEN I am asked to compare the Navy and Air Force, I answer that the Navy does a better job about one-third of the time, and the Air Force does a better job another third of the time. The last third is equal, but different. Although the Navy is undoubtedly the best of the services, for many reasons, I believe that we must look at areas in which the Air Force does better and incorporate their ideas into our service. This one-third rule applies to safety, too. The following observations come after spending 2½ years as an exchange pilot at Nellis. Some of their safety methods are good and warrant our attention, while some of the Navy's safety programs are excellent and deserve recognition.

First, the concept of "headwork" is found nowhere in the Air Force. It is, perhaps, one of the Navy's strongest safety equalizers. It rewards thinkers and doers with a high reputation. Headwork is a qualitative mark by which we are all judged, and woe to the person who develops a reputation for poor judgment. As naval aviators, we are used to seeing this mark on every grade sheet and in most discussions about aircraft incidents. There is an "airmanship" or "S.A." in the Air Force, but it doesn't carry the same weight.

The Air Force organization differs from that of the Navy. While land-based, the formal chain of command is much more in evidence. Once a month, the entire wing of five squadrons goes to the Officers' Club for a TGIF safety meeting. About an hour long, these meetings update everyone on topics of interest, review the latest mishap investigations, preview coming hazards (such as hot weather) and occasionally offer a guest speaker, someone in the wing who just had a near-miss or close scrape, complete with HUD film.

The most impressive aspect of these sessions is the participation by general officers. They are all there. It is evident that the general thinks these meetings are very important, emphasized by his presence. While not usurping squadron safety programs, it is valuable to see the concern right from the top. This leadership visibility increases the Air Force's sensitivity and reinforces the importance of the safety program.

In a contrast in styles, the wing's stand-down after Christmas is from 0730 to 0900, with the first brief at 0930. I would much prefer to have the whole day off, to think safety all day, get caught up with the inevitable paper work, mentally return from leave and plan the mission properly, like it is done in the Navy.

Again, the Air Force uses a more structured approach to flying. Control of the flight rests squarely with the flight leader, and wingmen do not go beaming around without being cleared off. There are tradeoffs, but one advantage is that a wingman learns how to be good by following his lead. There is a more formal atmosphere in teaching a wingman to progress to flight lead, and beyond. In fact, by regulation, a new wingman needs a minimum of 350 hours in type to upgrade to lead, and he goes through a minisyllabus to demonstrate his proficiency. Other positions include: four-ship flight lead, instructor pilot and check pilot, each

involving some sort of formal training.

In the Navy, many wingmen never learn how to be a flight lead; they just absorb knowledge, and when called on, after about a year, they just become a lead. Then the learning really begins. Wingmen in the Air Force will often lead a mission with a qualified instructor pilot flying as No. 2. In a Navy flight, it is usually the most senior person who briefs and leads the flight.

Debriefs seem to get more emphasis in the Air Force, too. Granted, we have additional duties that constantly call, but 50 percent of the learning comes from the debrief. Taking the time to improve by debriefing can really make a big difference.

The Air Force has specific programs that are excellent in making you fly more safely. An emergency of the day is presented at each brief, like the Navy. A boldface is done on the first day of each month prior to flying. While other aircraft's boldface might be longer than the F-5, one page could be done each month.

One of the outstanding programs is the Emergency Procedures Training sessions, also done on the first day of the month. A small number of pilots reviews the emergency procedures section, limitations and current problems associated with the aircraft. Informally, they review emergencies in all phases of flight, and more importantly, delve into the notes, cautions and warnings that a boldface misses. This is prime time to pass along gouge about an aircraft system that has problems. For instance, the aircraft won't start without the battery on, even if electrical power is hooked up. While not a B.S. session, this review permits an exchange of ideas and experiences that significantly increase aircraft and procedural knowledge. It is only about 15 minutes long and very worthwhile.

In contrast, there are some things that I felt more comfortable with in the Navy. The Air Force's aircraft forms do not include a history of previous gripes. While the Navy keeps a record of the last 10 flights' write-ups, once a gripe is signed off in the Air Force, it is no longer carried. A good memory is essential in tracking repeat problems.

Training rules are briefed as "standard," which is acceptable as each lead usually highlights a high-emphasis item; but briefing departure or spin procedures is not mandatory, even for ACM hops. I recall briefing these every time in the fleet and continue to do so. It is interesting to contrast the two services. In this case the Navy is more conservative.

Another advantage the Navy has is experience. A first-tour captain might get 600 hours in the F-15, while his Navy counterpart will get 900 in the F-14. Flying in a carrier environment is challenging, but it is also a maturing experience. Besides intercepting a Soviet bomber while loaded up 2/2/2, there is little flying more rewarding than a carrier landing. I sense, but cannot quantitatively say, that this experience helps in the flight safety realm. Emergencies and problems are resolved with more initiative, and there is also less temptation to shine one's fanny for excitement. After all, a Case 3 approach at night pretty much fills the bill for adventure.

Both services can learn from each other, borrow ideas and improve safety and quality of flying. The Navy's strengths come from autonomous operations around the ship where headwork often comes into play. The Air Force has the luxury of greater control of its shore-based environment, and its structure reflects this fact. The beauty of an exchange assignment is that whoever borrows the best ideas first will get even better first. ◄

LCdr. DuGene flew RF-8Gs with VFP-63, and F-14s with VF-84. He is currently serving an exchange tour with the Air Force's 65th Aggressor Squadron at Nellis AFB, flying F-5s.

The Problems With JOs

By LCdr. R.C. Owsley

ONE problem with JOs is that they're young. They just don't seem to see things the same way I do. They never take anything seriously. For example, have you ever tried to get any paper work out of them while they're briefing for a routine, day VFR flight? No way!

They won't even let a really important thing like a hot-to-go message concerning a list of nonrecurring reports interfere once they get in their "flying box." They appear oblivious to such pressing matters such as a less-than-shiny deck or a leaky toilet. This self-induced oblivion and outright refusal to deal with really serious matters is most prevalent just before and just after their scheduled flight.

JOs only seem interested in preparing for their flight or in debriefing a flight. Evidently they are entirely unable to brief a flight, talk to two other people, read the message board and chew gum at the same time. Heck, I can do all those things quite easily. Of course, I have taken off without my kneeboard on more than one occasion. But who's counting?

JOs always seem to hog all the good flight time. They are forever fighting over the really dark launches, leaving me to accept the dreaded 97 percent illumination night with a pinky launch. It's just not fair. They are even so rude as to volunteer for every flight offered. I mean not just the good-deal flights but for everything. On more than one occasion, I've listened in on their debriefs and was positive that I could have flown the flight better. It wasn't my fault that I had snivelled for no night flights during the month because of professional commitments above and beyond the call of

. . . Another really obvious problem with JOs is that they ask a lot of stupid questions, questions about engines, hydraulic systems and flight maneuvers . . .

duty. Yeah, the JO flight hog really gets my goat. He even flaunts it, as if I've never been one!

Another really obvious problem with JOs is that they ask a lot of stupid questions, questions about engines, hydraulic systems and flight maneuvers. Questions that are obvious signs of their ignorance and lack of NATOPS prowess. Oh, I could make it easy for them and answer their queries, but I prefer to have them research the topic and get back to me with the correct answer. Most of their questions have quite simple answers that I know I have learned at one point or another in my distant past.

The problem with JOs is their uncanny ability to derive new and presumably (don't make me laugh) "better ways" of doing things. Now I've heard everything! Don't they know that I have personally attempted every possible way of doing anything and that the way things are done now is the only way to do it? I really don't know where they get off bothering to try and reinvent the wheel.

JOs are always hanging around. That's a real problem. Haven't you seen it? Every time you turn around there they are just standing around acting like they want to help. My word, don't they know that the really important issues need top-level management to plan and coordinate just to ensure everything goes as planned? Could you imagine what would happen if we cut the JOs in on the decision-making process? Heaven help us all!

Another even more pressing problem is their familiarity with the enlisted men. I have personally seen and overheard JOs on numerous occasions just sitting around in their work centers with their divisional personnel just talking about the weather or sharing a common occurrence. I shudder to think of the repercussions of this type of behavior.

A more recent problem I've discovered is their inability to do anything on their own. They seemed determined to share their plans and ideas among themselves and to support each other in task accomplishment. I am extremely concerned about this type of unionization. What will become of individuality and of sneaking that special project behind your peers' backs so that you stand out from the rest? I really fear that all this JO LMET stuff is starting to take hold.

Now here is a really big problem with all JOs. It is their complete ineptitude at standing the duty. Why, I cannot recall the number of times that I have had to interfere with their duties. I, for one, have never found a JO yet who could make as quick a decision as I can make. If it wasn't for my busy schedule, I would just take the duty over myself. Of course, at quitting time and on weekends I would allow the JOs to take over. You know as well as I do that nothing happens at night or on the weekend.

The very newest problem with JOs and the potentially most dangerous one is just now beginning to manifest itself. The problem is physical conditioning. You can hardly get any work accomplished anymore. It seems like every time I want to route an important memo or check the currency of a 1968 instruction, the darn JO is either out jogging, playing racquetball or even worse, organizing a command sports team. The other day I just happened to overhear several JOs plotting to schedule the next command physical readiness test (PRT). Why, they've even had the audacity to post "no smoking" signs in their work spaces and even in the ready room. What is this Navy coming to?

Yes, the problem with JOs is well recognized amongst us more seasoned veterans. However, there is one very special sympton of that problem that is a pet peeve of mine. Have you ever challenged one of these JOs to the time-tested ritual of acey-deucey? They simply have no concept of the finesse, actual art and skill required to play this time-honored game. I watched a game between two JOs the other day and was appalled. Neither had the slightest knowledge of some of the most basic concepts of the game. Neither player ever attempted to distract his opponent's attention while at the same time improving his own position on the board. One actually left the board unattended just to answer the duty office telephone, and his opponent never even tried to move a single piece! Well, I tell you what, that really did it for me. I immediately grasped pen in hand and was compelled to write this article warning my fellow career officers of this growing mass of people known as JOs.

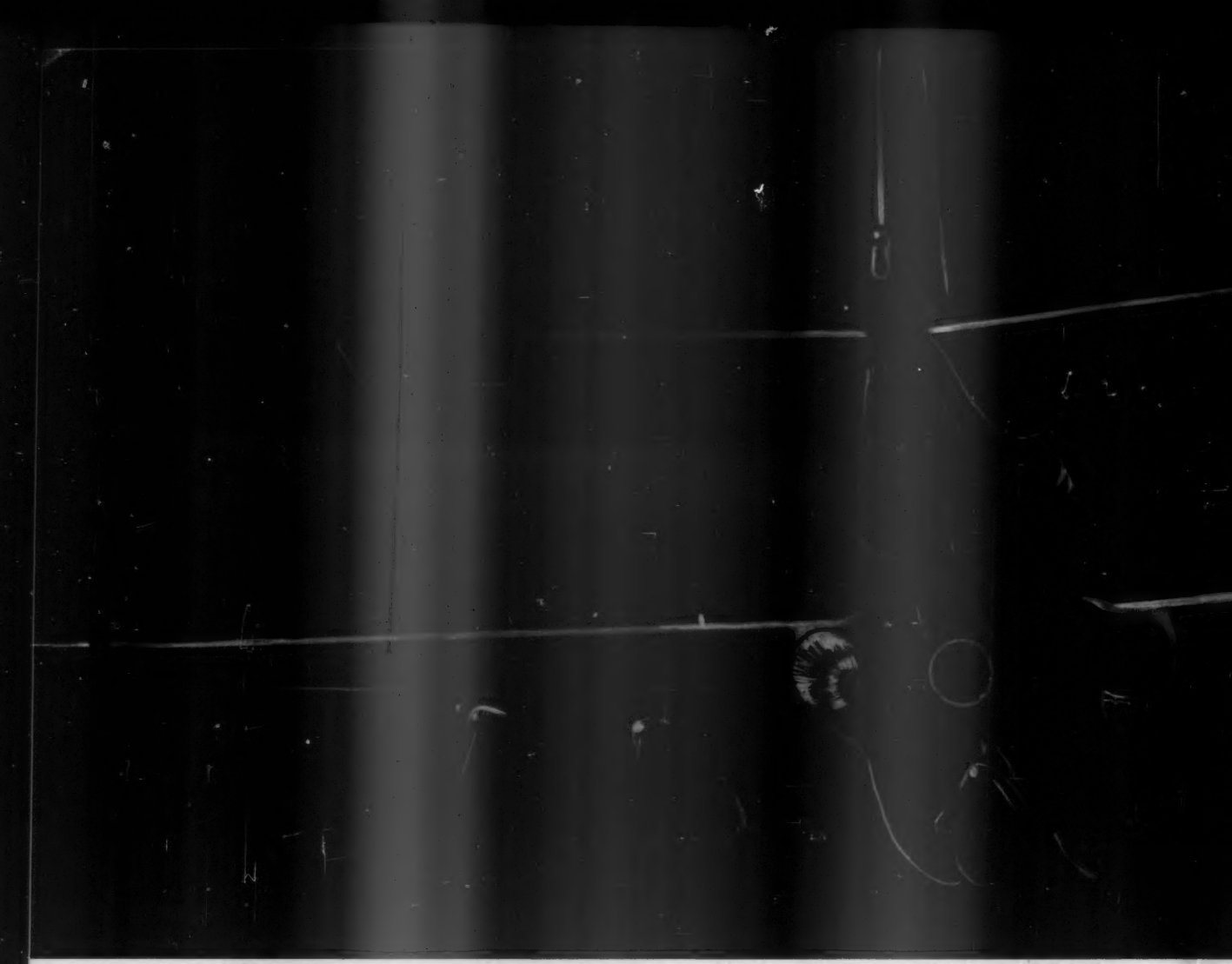
Of course, you know what the real problem with JOs is? The real problem is that I ain't one anymore. ◄

LCdr. Owsley is assigned to HS-2, NAS North Island, Calif.

One problem you won't have when you dial

1-800-HOT-SFTY

is getting a straight answer to your safety question.
This is the Safety Center's hot line and we are here to help.
Try us.



THE brief with my newly crewed B/N, who had just recently checked into the squadron, went as all briefs seem to go — OK. After many KA-6D tanker hops, these briefs tend to be repetitious. I recall the statement: "If there's anybody in the basket and we develop a problem, first things first — break away and get some space between aircraft."

We launched and established ourselves in the overhead refueling track. Soon, boredom set in, so the Air Force KC-135 that was up for practice plugs was just the ticket to kill the monotony. After we joined up and reaffirmed the fact that there is no harder way to get gas than to hit an 8-foot hose with no response, we headed back overhead into our refueling track.

After joining up with a flight of three A-7s and letting them practice until they had it down pat, a couple of Tomcats came up for the usual 2.0 apiece. As it became dark, we got a call from two of our squadron aircraft coming up for practice plugs. The Intruders joined, and we cleared lead for dry plugs.

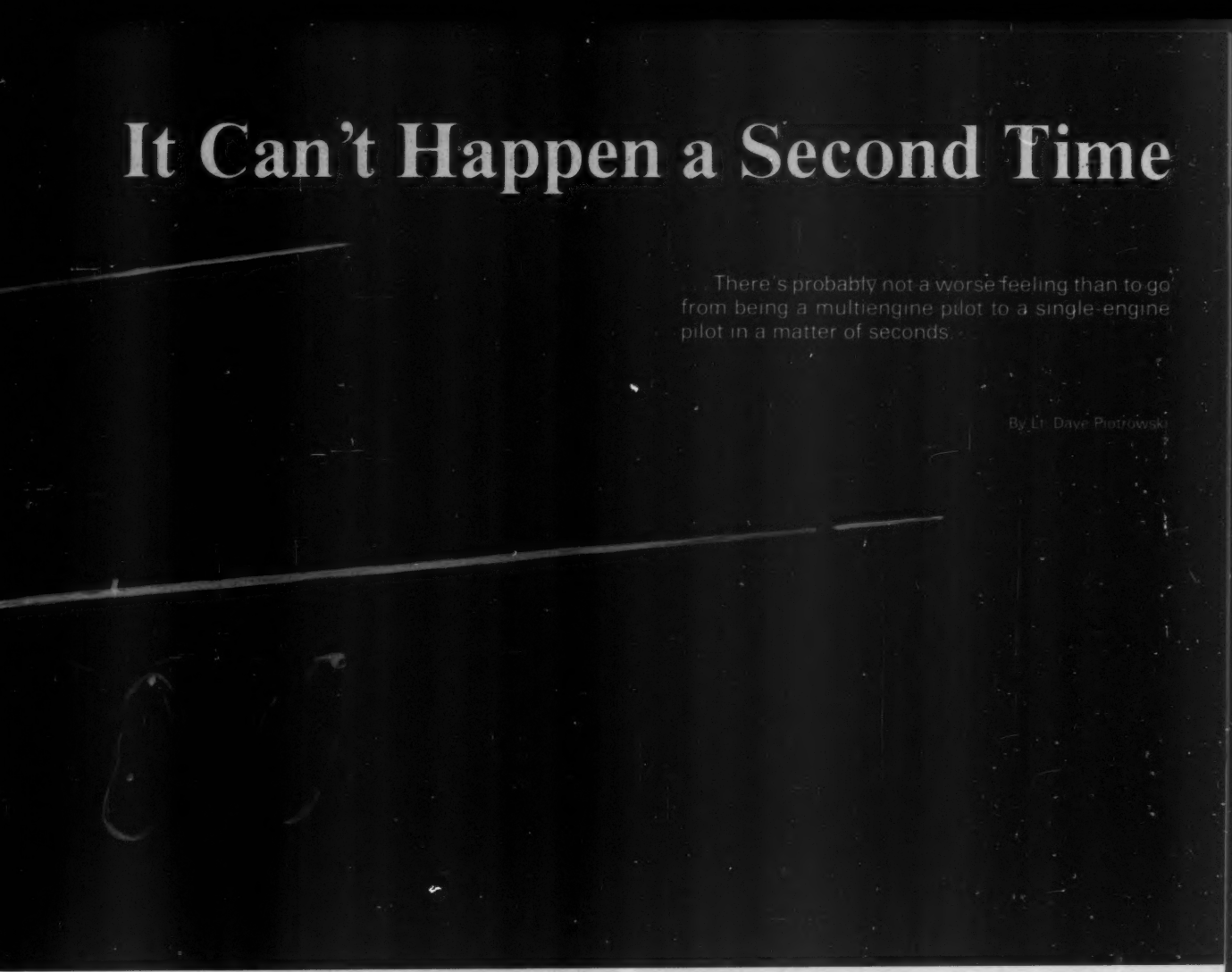
About this time we felt a small vibration and heard a sound like the engines were running at a higher power setting than indicated. Over the ICS came, "Hey, you hear that?" followed by, "Yeah, but I can't figure it out; everything looks normal." Checking and rechecking oil pressure and quantity, hydraulics, RPM, EGT, etc., turned up nothing. We decided to continue the practice plugs.

As the lead cleared off to the right, we cleared Dash 2 in. The package indicator went from "EXT" to "barberpole," indicating he was in for his first plug, then back to "EXT" as he set up for No. 2.

When the package indicator went "barberpole" the second time, that little vibration noise got very loud. "Disconnect, disconnect," I shouted. I jammed both throttles to military, looked for the "EXT" position on the package indicator and then retracted the hose. Mike, my B/N, looked out the right side and called the disengaging Intruder clear.

I looked down at the annunciator panel, and the right oil low light was staring me in the face. Pulling the right throttle to idle, I looked over at the oil pressure gauge and saw the needle fluctuating between 15-20 psi, with a flight

It Can't Happen a Second Time



There's probably not a worse feeling than to go from being a multiengine pilot to a single-engine pilot in a matter of seconds.

By Lt. Dave Piotrowski

idle limit of 35 psi. Time compression set in, and the next thing I recall is shutting the right engine down and telling my newly formed wingman, "Hang with me, I've shut down my right engine." There's probably not a worse feeling than to go from being a multiengine pilot to a single-engine pilot in a matter of seconds.

Mike pulled out the PCL and started going over the emergency procedures involved when we were asked, "What's your fuel load?" That's right: single engine, hot night, high density altitude airfield. What's that quote from NATOPS? "Under certain conditions and aircraft configurations, the aircraft will not fly single engine." We looked at the fuel gauge; 7.0 left in the main bag. With the information Mike came up with, we needed to lose 4,000 pounds in a hurry to maintain level flight.

Mike turned the IFF to emergency and told Tower what we were going to do. Tower called back and asked if we could make the arrestment on the off-duty. We said yes. I called Tower and told them to light the off-duty since all I could see was one set of runway lights. We ensured all the emergency procedures were complete and must have stepped over their reply because the next glance I took at the runway, I saw the same set of runway lights still lit, or what I thought was the same set.

"Where's the runway they want us to trap on?" I asked. Now Tower turned off the active duty lights and lit the off-duty. My question was answered. We made what seemed like 100 checks of the gear, flaps and slats. My B/N and I worked very closely since two heads are always better than one. Now we were on final. Soon we touched down and made a successful arrestment. As our plane came to its sudden stop, we knew this was one emergency that turned out OK.

I don't believe in bad luck, but this was my second engine that lost a main bearing and seized up. Maybe someone's trying to tell me something. Know the boldface EPs, the airfield's layout, where the arresting gear is and what seems like about a million other preflight items. It will keep an everyday hop from jumping in your face and taking your next birthday away. ◄

Lt. Piotrowski is an A-6 pilot with over 1,100 hours of which 800 are in the A-6. He is currently the NATOPS officer for VA-95.

Mishap Mission to Mexico

By LCdr. Stephen A. "Rocky" de Veer

ONE night, several months ago, I was roused out of bed at zero dark thirty and informed by the duty officer that I had an assignment. An assignment in my business means that a Navy or Marine Corps aircraft has crashed somewhere in the world. As an investigator for the Aircraft Mishap Investigation Division at the Naval Safety Center, I anticipated the inevitable. My bags were already packed, waiting for the launch to some picturesque Polynesian atoll with . . . . Ah, what a thought. But the harsh reality of the duty officer's voice brought me back to my senses when the name "Yuma" came up. That's right Yuma, Ariz., the other Polynesian garden spot of the world.

It turned out that the aircraft, a Marine F/A-18 Hornet, had crashed in the vicinity of Yuma. It had crossed the Mexican border and gone down in the state of Sonora. The sketchy details had indicated the aircraft had an engine fire followed by a hydraulic system failure. The pilot ejected safely and was rescued 45 minutes later by SAR helo. The only recognizable remains of the aircraft were the engines and a few hydraulic actuators, scattered across the desert floor. The rest of the airframe was dust and charred wire bundles.

LCdr. Stephen A. de Veer

Wreckage of Marine F/A-18 in Mexico.

Member of crash crew from MCAS Yuma, Ariz., cutting away composite wing material with a K-12 saw. He's wearing a firefighter's aluminized proximity suit.

Field forklift moving part of the Hornet's engine bay cowling. This vehicle later extricated the injured Marine by peeling back the cab of his wrecked Dragon Wagon, which was hauling a 30,000-pound field forklift.

My job as a crash investigator with the able assistance of the AMB and supporting troops was to raise the aircraft, like the mythical Phoenix rising from the ashes, from the desert dust, piece it back together, figure out the failure sequence and propose recommendations to prevent mishaps. Sounds easy, but my current "smoking hole" mystery became more complicated by the minute. A crash in the middle of a foreign desert is full of complications. Logistics, weather and confronting bewildered U.S. customs officials on our return were only a few minor inconveniences.

Our Marine invasion of Mexico started out as most military maneuvers do with enthusiastic confusion in the beginning, some inertia and final movement toward an objective, which in this case was retrieving the Hornet's burned and torn carcass from the baking sands of the Mexican desert. We were given the use of a motorized convoy consisting of three desert camouflaged low and high boys (military eight-wheel drive tractor trailers), 5-ton trucks, two "Dragon Wagons" with field forklifts, a 40-passenger bus, a 1-ton 4-by-4 pickup and a partridge in a pear tree.

The troops were in high spirits, loaded down with recently acquired "Meals Ready to Eat" (MREs), Gatorade and sunscreen. The convoy had to travel 30 miles to the border, then another 25 to the crash site. I was awed by the massiveness of this column of military machinery and thought, "How does one stop a convoy this size? Very carefully."

The convoy's interval and speed were set by the senior NCO as we rumbled across the southern Arizona desert. The Mexican customs officials were wide-eyed as the monstrous vehicles trundled through the narrow streets of San Luis, a sleepy border town. Were the Marines really storming the Halls of Montezuma again?

As we travelled toward the crash site on the one-lane highway, I noticed hundreds of white crosses and shrines off to the side of the road. My curiosity piqued; I asked what was the significance and was told that it is a Mexican custom to place markers where people died travelling to the U.S. border. The middle of the desert southwest seemed a lonely place to die.

The crash site was 50 minutes away at convoy speed. We were met by a contingency of Mexican federal troops and U.S. Marines guarding the wreck. Once there, everyone threw themselves into their assignments. The scattered aircraft pieces were quickly picked up and loaded into the trucks. The bulkier parts were strapped to the low boys and 5-ton trucks. At the day's end, we all congratulated ourselves on a job well done. We climbed aboard the passenger vehicles for the two-hour trek back home. Again the senior NCO briefed all

. . . Truck tires screeched on the hot asphalt. Trailers jackknifed, littering wrecked aircraft parts across the highway . . .

the convoy drivers about interval and speed.

No sooner had the entire entourage settled down to convoy speed on the highway when a call came over the walkie-talkies that parts were falling off a truck. The lead vehicle slowed down and pulled off to the side of the road. The high-boy directly behind also stopped. The radio suddenly cracked with a frantic scream of "stop."

Truck tires screeched on the hot asphalt. Trailers jackknifed, littering wrecked aircraft parts across the highway. Vehicles that were stationary lunged forward from rear-end impact. As the cloud of dust and smoke cleared, the only sound was the drone of a single-diesel engine. People bolted from the passenger vehicles to see what had happened. In the middle of the convoy, the Dragon Wagon, carrying the 30,000-pound field forklift, had failed to stop, rear-ending a high-boy, and causing a chain reaction. The Dragon Wagon's cab was completely crushed in on the driver, and the instrument panel now was part of the Marine driver's body.

As we ran to the disabled truck, we realized the most
20 immediate threat to the trapped driver was fire. The engine couldn't be shut off. Hydraulic fluid was squirting onto the hot motor, and diesel fuel flooded the entire cab area from a ruptured fuel tank. The only fire extinguishing agents available were PKP and Halon. Immediately, we set a fire watch and worked on shutting the engine off. Until that was done, we could only wait and plan our next move to extricate the driver. Finally, after several minutes of frantically searching for the fuel shutoff valve, the engine died, allowing us to begin the task of removing warped steel truck parts from the Marine's lower body.

Here we were in the middle of a desert in a foreign country without radio communications, with no "jaws-of-life" and without any medical care. It didn't look like we would get the driver out alive. But in the darkest hour, Marine ingenuity rose to the occasion. The field forklift was bounced off the jackknifed trailer and brought up to the front of the wrecked cab. A chain was hooked between the dash and forklift. With as much care as possible, the forklift peeled back the cab from the driver with repeated tugs on the chain. The danger during the extraction was from the chain disengaging or slipping and allowing the dash to snap back into the driver, possibly killing him. After 45 minutes of pulling and tugging, the driver was finally freed. He was conscious during most of the rescue.

His broken body was gently laid on the ground by five pairs of helping hands. We realized immediately that the corporal would die unless the bleeding in the groin was stopped. The crushed pelvis and broken leg were extremely painful but not likely to be fatal. Two crash-and-salvage personnel jumped in and tried to stem the flow of arterial blood. The flow decreased but the driver was still losing blood at a critical rate.

Now we had to raise radio contact with MCAS Yuma Ops to launch the SAR helo. The only transmitter within a 30-mile radius was back at the aircraft crash site five miles down the road. One of the officers sped off in a 4-by-4 to get help.

As dusk descended, the Mexican Highway Patrol came on the scene. The first traffic law in Mexico is, "You're guilty regardless of who's at fault"; however, don't try telling that to 40 tired and hungry Marines standing along a highway 50 miles from base.

Our primary concern was getting the driver to a hospital. An hour and a half had passed since someone went to make radio contact, and hope was fading fast for saving the driver's life. He was lapsing more frequently into unconsciousness.

The whop, whop of a distant helo renewed our hope

These Marine crash crew members, trained to give battlefield emergency medical aid, helped save the life of the injured Marine by pressure point treatment to stop bleeding.

Crash investigators sifting through the wreckage of composite materials from the F/A-18. They are wearing TYVEK suits to protect them from potentially dangerous carbon fibers.

that the injured Marine would be finally airlifted to a hospital. As the helo made its approach to the road, the highway patrol at first had difficulty stopping motorists but finally succeeded. Once finally on deck, the SAR crewman started an IV and prepared the Marine for Medevac. Forty-five minutes after touchdown, the SAR helo was airborne, winging the young Marine to the care of a trauma unit.

Now we could turn our full attention to cleaning up the road, righting the overturned vehicles and getting out of Mexico.

Traffic began to flow smoothly around the wrecked column, and we looked forward to going back home. But the Mexican Highway Patrol informed us that all 40 of us would be their "guests" in the local five-man jail until the paper work was finished. Luckily, the Mexican guards at the aircraft crash site had heard about the pileup and alerted their chain of command. The highest ranking military officer in Sonora rushed to the site to take charge and began issuing orders. His last order brought smiles to the Marines and disgust to the Highway Patrol.

"Escort the convoy to the border," he ordered. "Do not stop at the jail, just get them to the other side, pronto."

At 2230 we arrived at the U.S. border crossing and expected to pass immediately into the U.S. The customs officials knew nothing about our mission and were adamant about not letting military trucks from Mexico, even with USMC painted everywhere, through the gate. Somehow they thought we could be illegal aliens. Besides, the supervisor left three hours earlier, and he had the only key to the gate. Threats and confusion built up until a customs official found a master key and let the convoy through.

At 2330 the troops arrived back at the barracks emotionally drained and thoroughly exhausted, wondering if their comrade would live or die. They soon learned that he would be all right, which was the greatest reward for their efforts.

The investigation into the F/A-18 crashed continued. From the evidence gathered from the wreckage, the mishap board was able to determine that a broken compressor blade started an engine fire, which caused a total hydraulic systems failure and loss of aircraft flight controls. The recommendations that followed from this investigation have decreased the number of in-flight engine fires in Hornets and have conserved Marine Corp and Navy assets.

The young Marine driver is still recovering from his injuries. We were fortunate to have people on the wreckage recovery team who where prepared to take extraordinary measures to save a shipmate's life. We almost left a little white cross along a lonely Mexican highway with a U.S. Marine corporal's name etched on it. ◄

LCdr. de Veer is an investigator in the Aircraft Mishap Investigation Division of the Naval Safety Center, Norfolk, Va. Previously he was safety officer and a RIO with VF-74 at NAS Oceana, Va.

NTINS — F' Sure!

By LCdr. Tom F. Glover

DO you know the difference between a sea story and a fairy tale? A fairy tale begins with "Once upon a time," while a sea story starts with "Now, this is no ...."

This is a sea story. The brief for the four-plane ended with the standard flight-lead admonishment: "Be prepared for anything because you never know when the unexpected will strike." It was the end of one of our standard visual weapons detachments to MCAS Desert. Our squadron went there regularly when the weather turned sour at NAS Southeast. PTR waits for no man.

While my second-lieutenant student preflighted our TA-4J, I noticed "Brand X," (who were also on det because of the weather at homeplate) taxiing to the end of the runway for their four-plane go. Their target time immediately preceded ours. There was a Harrier just ahead of them, ready to take the duty. I remained far enough behind the student so he couldn't see me double-checking his preflight, and when I was satisfied with the thoroughness of his inspection, I headed up the boarding ladder just as he was strapping in.

"Now, remember," I said, "I'm just baggage on this flight. Pretend I'm not even here."

"Aye, aye, sir." Well, flight time is flight time. Maybe if he's losing in the beer bets, he'll give me a bomb or two.

Okay, let's look under the ol' seat and see what I find. Maybe I can win back a beer from the plane captain who brought my IFR Supplement back to me last week.

"Holy!" my student exclaimed. Since he was usually a pretty placid guy, I figured I'd better look up.

My first sensation as I raised my head was one of concussion. Then I saw something whip beneath our airplane. As I focused about 100 yards directly in front of me, toward the runway, I was shocked to see a huge ball of flaming wreckage hurtling toward me. That was all I needed to beat a hasty retreat down the ladder and start heading for maintenance control. Then, I remembered my student who was already strapped into the cockpit.

He'd obviously paid attention during his emergency egress drills because as I turned to look, I saw him leap out of the cockpit as though lifted by an unseen hand, sail over the canopy rail, hit the ground at a dead run, and before I could move, he was already beyond me, headed for the hangar. We didn't find out until later the next day that he had a hairline fracture in his leg.

While all this was happening, the wreckage struck our aircraft, Number 413, into two pieces, and passed on to either side of the jet, igniting it, too. At this point, the CO came out of maintenance control and saw what appeared to be his entire flight line in flames.

As the fire trucks came screaming out of the firehouse, my next impression was of most of our troopers dashing around looking for fire extinguishers, starting tractors to pull the rest of our airplanes out of the way, and a couple actually running around some of the flaming JP to man aircraft for the tow. When I heard the 20mm and LOX bottles cooking off, I knew it was time to leave the scene to those folks who were paid and trained for such things. So, being the det MO, I grabbed the line CPO and the first two E-6s I saw, and told them to muster the det in the parking lot behind maintenance. Then, I grabbed my student, who was sitting in a cockpit waiting for a tow, and hustled him out of the way, too, noticing his slight limp as we went.

A quick muster showed two troopers missing. Fearing the worst, I directed the chief to take everyone into the ready room and get them busy writing statements. I grabbed one of our battle-hardened first-class petty officers ('Nam helo gunship crewman) and went out to try to identify what I was sure would be horribly burned corpses.

As is usually the case, this frightening and catastrophic mishap included tragedy, relief, comedy and a few lessons learned. The tragedy was that the student pilot of the mishap aircraft from Brand X lost directional control of his aircraft, failed to abort the takeoff and departed the runway.*

The relief came, when, two hours after the mishap, the Marines who had collared our two missing troopers to get them to write statements, decided to inform us of their whereabouts. I thought they had been vaporized by the intense heat.

The comedy was provided by my second lieutenant student (the flying young man without a trapeze), and the line CPO, who gently reminded me, while the photographers were doing their work, that it would be unseemly for me to show up "in print" with a female plane captain sobbing on my shoulder, even though she thought two of her compadres were "morts." Momma might not understand.

The lessons learned were many; two still come to mind immediately. Know when to go, then go! And, you can never be too prepared for any flight evolution.

I lost track of my student after he got his wings and went off to fly F-4s — I think — for our brethren in green. If you're out there, shipmate, keep flying safely.

And, during our salvage effort, I slipped a lower ejection handle from 413 — it was lying loose amidst the wreckage —into my flight suit pocket. I have it in my helmet bag even as I write this. I'm convinced God put 413 between us and that flaming hunk of wreckage that was headed directly for my frozen carcass. Who says "13" is an unlucky number? ◄

*The SNA was attempting to compensate for a crosswind that was causing him to swerve to the left. After rolling 1,200 feet, his third correction was overcontrolled and the TA-4J entered a left skid and departed the runway. The nosewheel and left drop-tank struck the E-28 arresting gear.

The aircraft became airborne in an extremely nose-high attitude, climbing from 50 to 75 feet. It remained airborne for 3,700 feet with the wings rocking from side to side. The student pilot initiated ejection in a wings-level attitude. The canopy jettisoned and the aircraft began to roll. The aft seat came out at 60 degrees of roll, and the SNA cleared the rails at the moment of impact in 90 degrees angle of bank, killing him instantly. The Skyhawk continued to roll inverted and slid across the ramp, impacting three TA-4Js.

LCdr. Glover is an A-6 pilot with VA-176, deployed in USS *Forrestal* (CV-59). He is a former aviation safety officer, a Safety School graduate and the squadron's operations officer.

"Just Like All the Other Ones"

By Lt. Tom Ellison

THIS hop was going to be just like all the other ones before it. Or at least, that's what I thought. Another CAP hop. If I had a dime for every CAP I did, I'd be rich! I had just enough time to grab a quick slider, then I headed up to my trusty steed, just a little late, not bad. I just had to hurry up the preflight to make up for it.

The YAW SAS OP and YAW SAS OUT lights illuminated after the cat stroke. Having SAS's kick off during the cat shot is fairly normal in the Tomcat, so I didn't think much of it. After cycling the required circuit breakers and pressing master reset, I was able to extinguish the light.

My RIO and I drilled some pretty big holes in the sky for two hours. The autopilot got a pretty hefty workout while I busied myself by figuring out how much time it would take me to finish all the work that awaited me back on deck.

Since my relief launched late, I had to buster back for the break, all the while listening to Strike tell me to buster. "Thanks for the heads-up, Strike!" I thought.

We had the gas, so I tapped burner about 30 miles out and dumped the nose over, quickly slipping through the number as we descended through 15,000. I knew I was the last one on this recovery, and I didn't want to make the deck wait for me any longer than necessary.

I was out of burner at 15 miles. "Tally-ho," I told my RIO, picking out the ship in the haze so common in the Indian Ocean in the summer. At 600 knots, you go from 15 miles to five miles pretty fast, which is just about the time I realized that I hadn't swept my wings yet. Luckily, the wings are already almost all the way aft at that speed, so I hoped it didn't look too bad from the LSO platform. Maybe Paddles won't notice, I thought, as I broke at the stern at 500 knots.

About 120 degrees of turn and 6½ Gs later, just as I was applying a little bottom rudder to keep from climbing, that YAW SAS gripe came back to haunt me. Both channels failed simultaneously under the G-loading and rudder input. The aircraft abruptly rolled from 90 to 120 degrees angle of bank, and the nose yawed to the left, or more appropriately, down toward the water, which right now seemed to be getting much too close. I immediately leveled my wings and clicked the wingsweep switch to AUTO. Not being one to give up easily, I tried to save this approach. After putting the turn back in, I looked down at the airspeed. Two hundred twenty knots . . . that's flap speed, so down came the flaps. Approaching the 90, I quickly reviewed the landing checklist. Yep, everything looked good to me. At the 135, I hear, "102 paddles. Check your gear down." In astonishment, my eyes fell past the flashing WHEELS light to the gear indicator. Initially, I thought they were all down. They all looked the same. When in reality, they all indicated UP. I quickly slapped the gear handle down, but it was too late. The wave-off lights were already flashing.

I came around for an OK-3, which helped to offset the wave-off. Except for a slightly lower landing average and a little ribbing from my squadron buds, my jet, my RIO and myself were all OK.

Here are the important points I learned:

1. Don't let a distraction in the cockpit ruin your day. Checklists are used for a reason. Stick to them.

2. When using a checklist, don't look for what you want to see. Look at what is really there. It is all too easy to look at three UP gear indications and "see" three DOWN indications.

3. Know your limitations. Breaking at the stern at 500 knots is challenging even for the most experienced Turkey drivers.

All this incident cost me was a bottle and some pride — I got off cheap. ◄

Lt. Ellison is a first-tour pilot with the Fighting Aardvarks, VF-114.

Lt. Hector L. Correa

Lt. Hector L. Correa
LCdr. John F. Padilla
HT-8

Lt. Correa (instructor pilot) and LCdr. Padilla (student flight surgeon) were practicing normal approaches on a routine familiarization hop at Spencer OLF. After departing the abeam position and passing through 400 feet AGL, Lt. Correa heard popping and chugging along with high frequency vibrations from the engine compartment. He assumed control of the aircraft and lowered the collective further to expedite the landing and reduce power demand on the engine in accordance with NATOPS procedures for a compressor stall.

Scanning the engine gauges, both pilots noted that the TOT light had illuminated and the indicator needle had pegged, indicating an engine overtemp. Continuing with NATOPS procedures, Lt. Correa rotated the twist grip to flight idle, leveled the wings, assumed an autorotational profile and directed the aircraft toward the only available landing area. He initiated a flare at 75 feet AGL and raised the nose to slow the helo's groundspeed.

At this point, the engine-out light illuminated in conjunction with the engine-out audio indicating a total engine failure. Lt. Correa leveled the aircraft and completed the autorotational recovery into a freshly plowed farmer's field. The helicopter settled nose low into the dirt up to the front cross tubes as it decelerated.

As the aircraft started to rock forward, Lt. Correa froze the controls, maintained touchdown heading, and allowed the helicopter to come to a stop. When all motion ceased, the pilots completed an emergency shutdown and exited the aircraft.

BRAVO ZULU

1stLt. K.L. Smith, USMC
1stLt. D.S. Wiggins, USMC
Cpl. D.D. Smith, USMC
LCpl. T.W. Hanna, USMC
HMM(C)-164

After the two CH-46s launched on a pre-dawn amphibious assault on the Zambales peninsula, 1stLt. Smith established his section in delta overhead USS *Peleliu* (LHA-5). In addition to his four-man crew, he carried 16 passengers.

The first indication of a malfunction were alternate surging of the No.1 and No. 2 engine power turbine speed tachometers (Nf), followed rapidly by various engine instrument fluctuations concluding in the loss of the No.1 engine.

LCpl. Hanna saw sparks coming from the left engine and 1stLt. Smith quickly moved the No. 1 engine condition lever to stop. The Sea Knight was now single engine, 20 miles at sea, in the dark.

1stLt. Smith decided to head for land instead of the ship, and proceeded direct to Cubi Point with his wingman. En route, the crew jettisoned fuel down to a manageable weight and made a successful landing on the runway.

Left to right,
1stLt. D.S. Wiggins,
Cpl. D.D. Smith,
1stLt. K.L. Smith,
LCpl. T.W. Hanna

Left to right,
Lt. David M. Williams,
Lt. Russell P. Knight,
Lt. Robert S. Spratt

Lt. Russell P. Knight
Lt. David M. Williams
Lt. Robert S. Spratt
VA-55

Lt. Knight (pilot) and Lt. Williams (B/N) had just catapulted from USS *Coral Sea* (CV-43) on a day-bombing mission in the western Mediterranean when their A-6E's starboard gear doors failed to close after raising the gear. Climbing to a safe altitude and proper airspeed, Lt. Knight called for a wingman to assist in trouble-shooting the unsafe gear indication. The wingman confirmed that, with the gear handle in either the up or the down positions, the starboard main landing gear remained firmly locked in the wheel well. NATOPS emergency extension methods failed to dislodge the hung gear, so Lt. Knight and Lt. Williams were committed to a dirty divert to NAS Sigonella where they would attempt a "two-down, one-up" arrested landing at dusk.

Waving the pass at Sigonella was Lt. Rob Spratt (who was featured in a Dec '87 "BZ"). He had diverted in another aircraft to assist in the landing. Lt. Spratt talked Lt. Knight to a touchdown point just before the arresting gear; however, the hook struck a doughnut support used to raise the arresting wire off the runway. Lt. Williams called the hook skip over ICS to the pilot. Despite the starboard wing tip dragging on the runway, Lt. Knight was able to get the aircraft safely airborne and back around for another pass. This time the arrestment was successful. The aircraft came to a stop on the port main mount, the nose gear, and the starboard wing tip. Total damage was limited to a lower speed brake panel and a drop-tank tail cone.

Lt. Brent Barrow
Ltjg. Joe Bauknecht
AW3 Tim Bergh
HSL-42
Lt. Tom Buterbaugh
USS *Simpson* (FFG-56)

The Sea Hawk departed on Persian Gulf night operations at 0200. Lt. Barrow (HAC) and Ltjg. Bauknecht (ATO) heard a loud bang followed by an immediate rise in rotor speed and turbine gas temperature (TGT) on their No. 2 engine. The No. 2 power control lever was retarded with no decrease in power. As the TGT continued to rise through 1,000 degrees Celsius, Lt. Barrow saw flames coming from the starboard engine compartment. AW3 Bergh (helicopter aircrewman) confirmed that the engine was on fire. The No. 2 engine was secured and the fire extinguished.

Lt. Buterbaugh, the Officer of the Deck on the USS *Simpson* (FFG-56), received the H-60's mayday call. He immediately set emergency flight quarters and accelerated the ship to 25 knots. While the aircrew dumped fuel, Lt. Buterbaugh calculated the helo's time to recovery. This coordinated effort by the LAMPS team set up a single-engine recovery into the 3-by-3.5-foot rapid securing device.

Through superior coordination and by strictly following NATOPS procedures, the LAMPS Mk. III team minimized the damage and successfully recovered a crippled aircraft.

Left to right,
Lt. Brent Barrow,
AW3 Tim Bergh,
Ltjg. Joe Bauknecht

An Eventful

By Lt. Andrew J. Hines

I HEAR the fire trucks coming as I stare in disbelief at my plane, which had dug itself into the dirt beyond the runway overrun. What the hell happened, and what exactly had I done wrong? With the sinking realization that I am awake during my own worst nightmare, I see the end of my short career. The pilot tosses his helmet into the dirt. Maybe he feels the same way.

It was only my fourth flight in the squadron. I had about 50 hours in the Viking; yet, I hadn't flown enough to have a mishap.

Let me start at the beginning. Operating on a det to NAS North Island, our squadron was working hard to accumulate quals in torpedo-delivery exercises, mining and some ASW ops. The squadron was flying hard and maintaining a long-standing safety record.

Early one morning I briefed with the pilot, the mission commander and the senso to go on a torpedo-delivery exercise. After a thorough brief, we manned up. Although the rest of the crew felt a little uncomfortable flying out of a strange airfield, I did not, having only recently left the FRS at NAS North Island for my East Coast squadron.

Once airborne, we transited the various warning areas until we were on station near San Clemente Island. The weather was fair, with only slight haziness and some broken cloud layers starting around 2,000 feet. We put our fish in the water after being airborne about two hours and 45 minutes.

We were ready to RTB and made our call to do so. However, the range controllers asked us to remain on station to track their misbehaving target vehicle, which was heading off range. For two more hours, we tracked the errant target. Both the pilot and myself (as COTAC and copilot) kept shooting glances at the fuel gauge, watching it relentlessly unwind.

At 2,500 pounds (above NATOPS and local field minimums), we headed for North Island, which ATIS and Metro were calling IFR because of fog. The pilot and I concluded El Centro was going to be our alternate if a PAR into North Island didn't work.

With approach checks complete, we were waiting for a GCA pickup when we heard another Viking behind us declare an emergency because it had lost an engine. We were assigned a new frequency, and the controller gave us our initial headings and altitudes.

Since the current vector took us farther away from the field and toward the mountains, I gave the controller a heads-up

The aircraft drifted to the right and started to skid. The pilot stood on the emergency brakes, and I felt the port main mount tire blow.

Landing

call. Obviously things had gotten busy because of the emergency aircraft. The controller responded with headings that set us on the extended runway centerline to 29. We were switched to another controller as our descent to glide slope began. We discovered we were on the same frequency as the emergency aircraft, which I believed to be following us. Then we were assigned to our fourth and final controller.

Approximately six miles out and passing through 1,500 feet, we dirtied up and completed our landing checks. We received calls saying we were "above" glide slope and then "slightly above" glide slope. The controller still called, "slightly above" glide slope as we broke out of the obscuring clouds at 700 feet. I reported the runway in sight, and tower cleared us to land.

We were high and fast, but the pilot felt he could make a safe landing. As we crossed the threshold, I reported, "Two thousand feet per minute descent."

The pilot responded, "I'll flare it a little." The meatball, of course, was high. As we came in and the pilot flared, our light aircraft floated, touching down about 1,000 feet past the datums.

I immediately looked over my shoulder for the spoilers and saw a clear wing. "No spoilers," I called. The pilot said nothing. "Boards," I called and reached for the speed brake switch on the throttle and extended them. Could the pilot have forgotten to extend them? I guess so; he was getting more and more distracted by the approach and the combination of our flared landing, the weather, fuel and the emergency aircraft.

30 "Andy, hit your speed brake switch," the pilot called. But of course I already had, with no results.

"I'm not getting extension," I said. I knew the first step in the procedure of "no spoilers" in NATOPS: Execute a go-around if adequate runway or arresting gear are not available. Perhaps the pilot felt we couldn't go around because of all the factors we were aware of.

"We'll keep it on the ground," he said.

I immediately took stock of the situation. We should have 6,500 feet of runway remaining; anti-skid brakes will stop us. The arresting gear is 1,600 feet from the overrun, and I trusted the pilot's experience.

"OK," I said.

The pilot tried his anti-skid brakes and got nothing. He immediately went to normal and again got nothing. We should have gone around, I silently thought, as I saw 3,500 feet remaining. Now we couldn't get safely airborne and clear Point Loma. The hook was coming down for the long field gear. It skipped.

The aircraft drifted to the right and started to skid. The pilot stood on the emergency brakes, and I felt the port main mount tire blow. The aircraft slid to the right and onto the port wing tip. There was no way to eject safely now that we were rolled over about 30 degrees.

What happened next was more like a car crash than anything else. I said over the ICS, "It's OK, we're going into the dirt." I wanted to keep the guys in the back from pulling their handles.

The aircraft skidded off the right side of the runway and into the dirt by the overrun. The port main mount dug in and whipped the aircraft around, burying the nose gear. I saw dust and debris slide up onto the windscreen. The pilot shut the engines down, and we all made an emergency exit.

So here I stand, watching a shocked pilot kick his helmet around and two very scared back seaters wondering what happened. I know I should have insisted that the pilot execute a go-around. I also know why I didn't insist and wound up following the pilot's judgement.

I'm the right seater, the new guy; he has hundreds of hours. He must know the aircraft better than I. All through the training command I had grown used to pilots who all had a thousand or more hours. Those pilots had all survived the natural selection of their first sea tour.

Later it was determined that although the pilot made correct procedural decisions, an unlucky series of mechanical failures after the pilot had committed himself to landing were the direct causes of our mishap. The direct lift compensation (DLC) failed to disengage, which in turn prevented the spoilers from actuating. The pilot chose not to get airborne again because of low fuel, worsening IFR conditions and an emergency aircraft following us on the approach. This emergency aircraft may have fouled the runway, closed the field and put us at minimum fuel for bingo.

With fully functional anti-skid brakes and 8,000 feet of runway, a safe stop would normally be no problem. However, anti-skid brakes subsequently failed, causing a complete dump of brake pressure. Selecting anti-skid off did not regain braking power. When the hook came down to catch the long field gear, the hook-straightening snubber broke, allowing the hook to skip uselessly. Although selecting emergency brakes provided minimal braking, it locked the port main mount tire, caused it to blow out and resulted in our skid.

Your role as COTAC, RIO, BN or whatever, no matter how new, is to be the backup, the pilot's conscience to keep him and you out of trouble. A timely observation or remark may save both your lives by bringing his focus, his priorities, back to the situation.

The lesson is simple: You may be a "new guy," and it's only natural to have a lot of respect and faith in the more senior guys, but don't let that cloud your judgment regarding accepted procedures. ◄

Lt. Hines flies with VS-31, an S-3 squadron based at NAS Cecil Field, Fla.

Undetectable errors are infinite in variety, in contrast to detectable errors, which by definition are limited.

Ace L.

. . . A quick glance at the oil pressure gauge confirmed the worst. Pressure was dropping at an alarming rate . . .

Land As Soon As Possible!

By Lt. Paul Shaw and Lt. Tony Karkainen

THERE we were, on our way to NAS West for a "good deal" weekend cross-country. The skipper had given us the keys, and our SH-2F Seasprite helicopter cruised smoothly through the VFR corridor of West Coast International TCA. Below us, tracts of houses stretched as far as the eye could see. Just one more brief fuel stop and we'd be at our destination, enjoying the sunshine and local hospitality.

Suddenly the bright glow of a master caution light and a gearbox oil pressure caution light ended our cross-country. A quick glance at the oil pressure gauge confirmed the worst. Pressure was dropping at an alarming rate. My copilot initiated a turn back in the direction of a municipal airport we had just passed.

I broke out the NATOPS checklist. The procedure for over-land situations states, "Land as soon as possible." A check revealed no safe landing areas. For over-water situations where a safe landing site could be miles away, procedures call for the aircraft to proceed at 50 feet and 50 knots to the nearest safe landing site and prepare to ditch. The number of buildings, tall antennas and high-tension power lines in the immediate vicinity made this impractical. As briefed, my copilot, who was on the controls, continued to fly and make the radio calls while I broke out the pocket checklist and switched up the proper frequencies. I monitored the gauges while my copilot tried to contact center. Because of heavy traffic on the frequency, normal calls and a PAN report received no response. Finally, I switched the radio to guard and instructed my copilot to give a MAYDAY call. Center responded immediately, assigned a discreet squawk, cleared the regular frequency and provided vectors to the municipal airport.

En route, I spotted a baseball field adjacent to a school. As we approached, I could see a little league game was in progress. Any thoughts of trying to make a safe landing there disappeared. The combining gearbox and transmission oil pressure gauges dropped to near zero and fluctuated sporadically as we flew over a large parking lot.

The idea of a landing there crossed my mind, since it was obvious that we were fast running out of time. The problem was that the lot was jammed with cars and weekend shoppers. Once again we pressed on with no safe landing area in sight. My copilot pointed out a cement aqueduct that ran in the general direction of the airport. It required a slightly longer route but kept us clear of houses and buildings in the event an immediate landing became necessary.

As we neared the municipal airport, I reviewed the immediate landing/ditching checklist and reiterated the steps we had covered in our brief. We sighted the airport, and center coordinated our clearance to land with the tower (VHF only). We elected a low, slow approach to minimize power changes and stress on the gearboxes. An uneventful touchdown followed, and we taxied clear of the runway, trailing a wide slick of oil. The local county fire truck summoned by the tower was on hand if needed.

Postflight inspection revealed that the main transmission oil scavenge line had separated at the manifold junction, and oil was lost from both gearboxes. We had been extremely fortunate. The assistance of center in coordinating our clearance and good crew coordination (by following the routine we had established in the brief) overcame what could have been disastrous circumstances. This crew now knows the true meaning of "Land as soon as possible." ◄

Lt. Shaw was flying with HSL-33 at NAS North Island, San Diego, at the time of the incident and is now with the Recruiting District, Miami, Fla. Lt. Karkainen is still an SH-2F pilot with HSL-33.

Aerobatic Orion

By ADC(AW) Paul Speaks

GENERALLY, approaches at night into a terminal control area are routine, but you should never relax just because the air traffic controllers do such a good job.

We were on the last leg of what seemed like a marathon flight. It started with an early preflight of our P-3, which developed a downing discrepancy about two-thirds of the way through. No other aircraft was available, so we had to wait. As a former maintenance control chief, I understand it takes time to isolate the cause of what can appear to be a simple problem.

At NAS South, the weather was somewhat worse than predicted, causing delays in our takeoff time. This air station is known to keep thirsty aircraft on the ramp during frequent lightning activity, and we sat waiting for a fuel truck like everyone else. Three hours later, with all four running, we taxied onto the active and took off. At home plate, the weather was nice: 3,000 scattered, virtually no wind, a few puffy clouds over the big lake and the twinkling lights of the city below.

After recalling his logbook to try to remember what he needed, the PPC (patrol plane commander) elected to take a GCA. The windshields glowed white as the landing lights reflected off the cloud we entered. Our night vision already shot, I reached up and turned off the lights. We were in the cloud for what seemed to be eight to ten seconds.

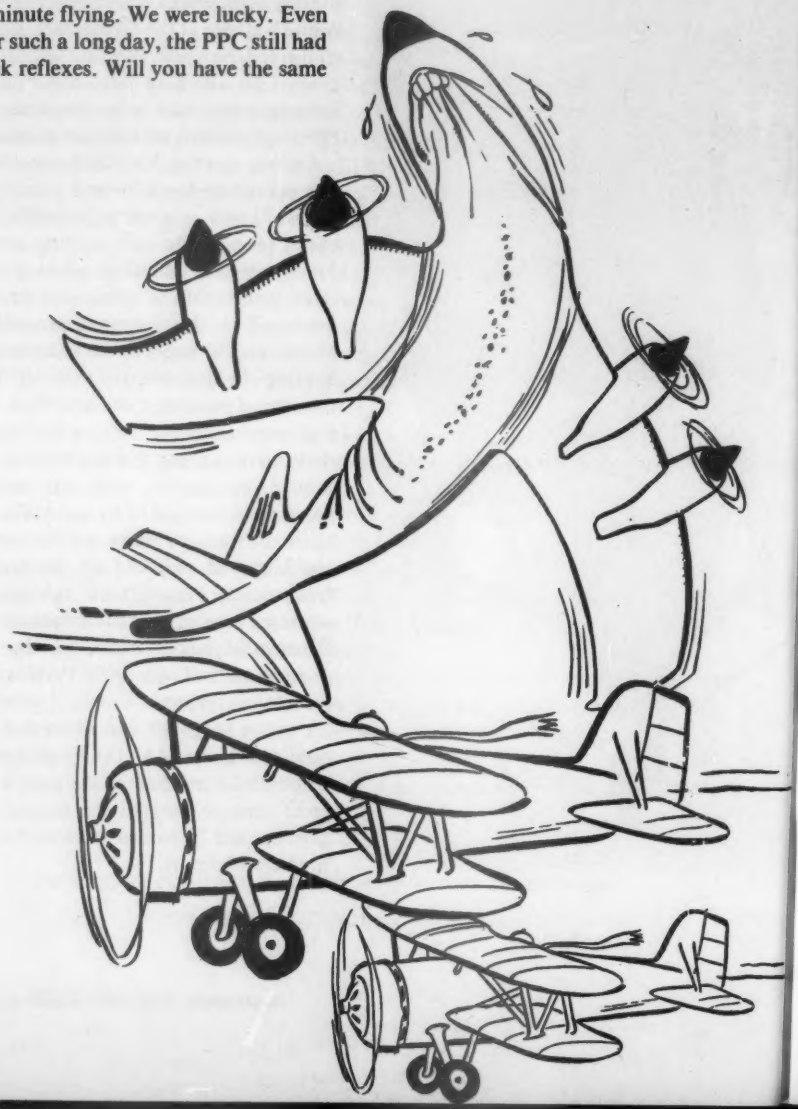
I turned the lights back on as we exited. I heard the copilot take a very deep breath, and the pilot say, "Oh, my god!" They began an extremely steep turn. The view directly ahead was filled with two small biplanes, which had also initiated a turn, with probably the same degree of panic. Our routine GCA had disappeared, and everyone aboard was 100 percent awake and looking.

The biplanes came from a large, week-long air show for experimental aircraft. The location is known for its saturation of wood and fabric-covered aircraft, but they rarely fly as far south as these two did. Small aircraft, especially those made of wood and fabric, do not give an adequate radar return. Common sense will tell you that aircraft exterior lighting should be used to make sure you are seen, *not* so you can *see*. It could have been because of their diminutive size, but these little biplanes were not overloaded with common sense; neither had his lights on. If it had not been for our landing lights, the near catastrophe would not have been averted.

The moral of this story doesn't concern always turning on your lights at night, flight planning or overextension of personal stamina. It concerns minute-to-minute flying. We were lucky. Even after such a long day, the PPC still had quick reflexes. Will you have the same quick reactions when you need them? We were operating within our safety envelope, but fatigue will sneak up on you with unforgiving vengeance. People die for many reasons. Stay alert, and let old age take its toll. ◄

During a GCA, one of the advantages of a multicrewed aircraft is the availability of an extra set of eyes to look outside the cockpit. Use 'em! — Ed.

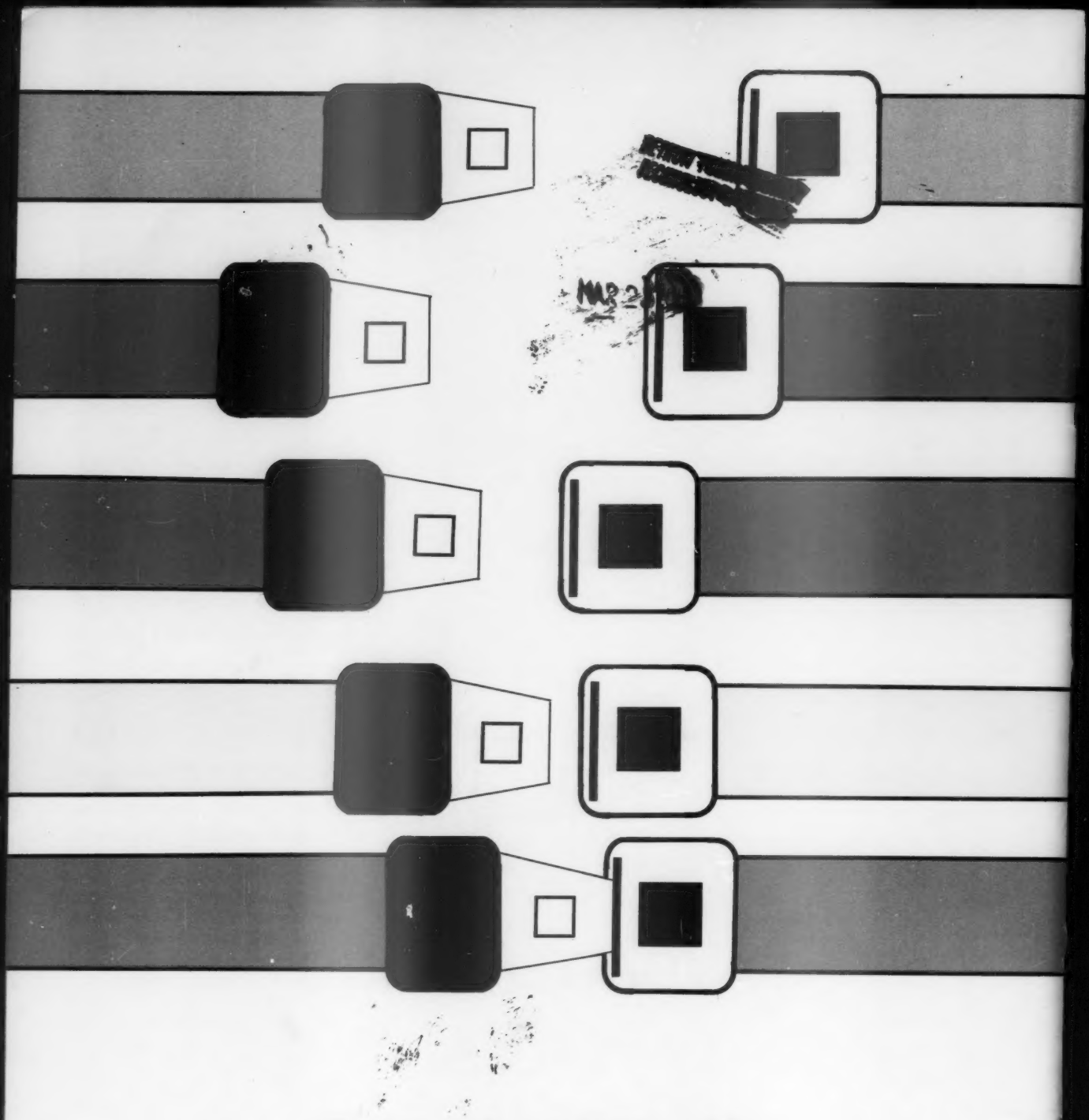
ADC(AW) Speaks is the QA representative for Commander, Reserve Patrol Wing Atlantic. He has logged over 2,500 hours in patrol aircraft, and also has VF and AIMD experience.



ONE OF
FOD'S
FAVORITE HIDING
PLACES

CHECK IT OUT!

Poster idea contributed by Lt. J.H. Shattuck, Asst. Safety Officer, VA-95.



One size fits all.

Poster idea contributed by SKC/SS Noel A. Rabino, PMOLANT, Charleston, S.C.